

RESTORATION OF THE CLARK FORK AND BLACKFOOT RIVERS NEAR MILLTOWN DAM

This fact booklet summarizes the *Draft Conceptual Restoration Plan for the Clark Fork River and Blackfoot River Near Milltown Dam*.

The State of Montana, in cooperation with the U.S. Fish and Wildlife Service and Confederated Salish and Kootenai Tribes, released this plan in May 2003 for public review and input.



I Objectives of the Draft Conceptual Restoration Plan

The *Draft Conceptual Restoration Plan for the Clark Fork River and Blackfoot River Near Milltown Dam*¹ (DCRP) provides a vision of how these rivers might be restored if Milltown Dam and a large portion of contaminated sediments behind it were removed. The U.S. Environmental Protection Agency (EPA) and the Montana Department of Environmental Quality (DEQ) have proposed this removal as the preferred alternative in their April 2003 proposed remediation or “clean-up” plan for the Milltown Reservoir.² The DCRP is a broad scale plan that provides restoration concepts, draft plan views, elevation information, and restoration cost estimates. The DCRP builds on the proposed remediation plan and was developed with the following objectives:

- Restore the confluence area of the Blackfoot and Clark Fork Rivers to be naturally functioning and self-maintaining;
- Use natural, native materials, to the extent practicable, for stabilizing channels, banks and floodplain;
- Improve water quality by reducing the rate of release of contaminated sediments through bank erosion outside the area covered by the remediation plan;
- Provide high quality habitat for fish and wildlife;
- Improve aesthetic values in the area by creating a diverse, natural setting; and
- Provide recreational opportunities such as river boating, fishing, and trail access for hiking and bicycling.

II A Vision for Restoring Two Rivers: The Conceptual Plan

The State proposes restoring the Blackfoot and Clark Fork Rivers in the area of Milltown Dam using natural channel design. Natural channel designs restore injured rivers by emulating the pattern and shape of healthy channels and floodplains in valleys of similar landform. Materials such as native vegetation, trees

and rock are used to construct or repair river channels and floodplains so that they look and function naturally. The pattern and shape of the channel and extent of the floodplain depend on the river basin's water capacity and valley landform. Narrow, steep valleys have straighter channels with less floodplain, while wider, more gradual valleys have



Paul F Updike

meandering channels with more floodplain. River flows remain in the channel up to normal high flow, and then expand onto the floodplain at higher flows. Both types of valley landforms exist in the study area as summarized in Table 1. Natural channels are designed to support natural processes such as sediment transport and deposition, channel adjustments including erosion of banks, and flooding. However, these processes are less severe and more predictable in healthy, stable channels like those built using natural river design.

The opportunity exists to recreate a setting similar to historic conditions at the site. To develop the DCRP and describe the potential river attributes, the two rivers were partitioned into six reaches based on several criteria, including: 1) existing channel and valley type; 2) the potential features of restored channels; 3) the availability of information; 4) the upstream influence of Milltown dam; and 5) the nearest stable point to end the restoration. Figure 1 and Table 1 identify these reaches and their potential attributes. Four reaches (CFR1, CFR2, and CFR3 and BFR1) are directly affected by the dam. Restoration of the two additional reaches (BFR2 and CFR4) was included in order to provide a comprehensive restoration plan that will be successful in the long-term.

The DCRP proposes a diversity of wetland habitats. Some wetlands would remain and others would be created through restoration. Restoring sections of the Clark Fork River requires changing the channels from damaged, braided channels to a single channel. Abandoned stream channels would be partially filled, converting open sections to isolated wetlands. These wetlands would be fed by flood flows and groundwater.

Some deviation from historic conditions would be necessary to protect bridges, limit erosion of remaining contaminated sediments, and protect newly constructed sections of river. Rock weirs (Figures 2 and 3) are proposed to maintain riverbed stability and protect bridge pilings in the Blackfoot and Clark Fork Rivers near the dam. Rock structures would provide grade control, thereby protecting newly constructed channels above and below where Milltown Dam currently exists. These structures will also provide high quality fish habitat and recreational boating, particularly in reach CFR1 and the lower half of reaches CFR2 and BFR1.

The natural channel design proposed by the DCRP relies on existing vegetation and intensive revegetation. This strategy provides for bank stability, reduced energy of water flowing onto floodplains, high quality fish and wildlife habitat, and the aesthetics and recreational opportunities found in a natural river setting. It re-establishes native plant communities and inhibits noxious weeds.

III Relationship Between Remediation and Restoration

The relationship between remediation and restoration activities is both simple and complex. Simply stated, remediation, required by EPA and DEQ, is intended to protect human health and the environment at sites contaminated with hazardous substances. Remediation is also commonly called “remedy” or “clean-up.” The proposed remediation plan at the Milltown Dam Operable Unit

Table 1 Potential Attributes and Estimated Costs of Restoration Actions by Reach

FEATURE	REACH					
	CFR1	CFR2	CFR3	CFR4	BFR1	BFR2
Downstream point	I-90 Bridge	Confluence	Duck Bridge Grade	Extent of direct influence of Milltown Dam	Confluence	Stimson Dam
	Confluence	Duck Bridge Grade	Extent of direct influence of Milltown Dam	Turah Bridge	Stimson Dam	Extent of influence of Stimson Dam and fill
Approximate valley length (ft.)	5,250	3,850	7,000	15,400	5,640	6,500
Gradient	Low	Moderate-Low	Low	Low	Moderate-Low	Low
	Moderate	Moderate-High	High	High	Moderate	Moderate
Meandering	Step-pool	Step-pool; Riffle-pool	Riffle-pool	Riffle-pool	Step-pool	Step-pool
	Narrow	Narrow-Wide	Wide	Wide	Narrow	Narrow
Instream habitat	Moderate, sloping	Moderate, sloping – Wide, flat	Wide, flat	Wide, flat	Moderate, sloping	Moderate, sloping
	\$10.5	\$9.2	\$4.9	\$5.8	\$2.9	\$5.1
Estimated Restoration Costs (millions)						

involves two primary objectives: 1) protecting human health by cleanup of the groundwater aquifer beneath Milltown through the removal of the most contaminated sediments and the dam's spillway and radial gate sections; and 2) protecting downstream fish and aquatic insects from releases of contaminated reservoir sediments, which occur with ice scour, draw down or high flow events. The remediation plan is also designed to comply with applicable regulations such as water quality regulations. Restoration actions, in contrast, go beyond remediation actions with the objective of returning a site to an uncontaminated, more natural, "baseline" condition. In addition to the objectives in the remediation plan, the *DCRP* proposes several objectives for restoring and preserving natural resources, as well as enhancing the enjoyment of the site by people.

Table 2 summarizes the major features of remediation and changes needed for restoration. The *DCRP* offers a more detailed, "action-by-action" comparison of proposed remediation and restoration.

Many remediation plan elements, such as sediment removal, would not be altered under restoration. Other remediation and restoration activities at the Milltown Dam site can be combined and coordinated in two ways. First, restoration designs can be combined with remediation designs. For example, it would be inefficient to have remediation actions build a river channel to meet clean-up objectives and then have restoration contractors later remove the remediation-designed channel and construct a more natural channel to meet restoration objectives. Second, restoration designs can "augment" remediation designs. An example would be increasing the quantity and diversity of plantings in the floodplain beyond what is planned under remediation. Combining the two plans would allow remediation and restoration to be implemented at the same time and reduce the costs. An example of good coordination is remediation and

restoration activities along Silver Bow Creek downstream of Butte. The EPA and DEQ have indicated their support for integrating remediation and restoration actions at the Milltown Dam site.

IV Recreational Components of the Restoration Plan

The *DCRP* enhances many recreational activities for the public. River boating, fishing, wildlife viewing, hunting and trail access are some of the activities that would be improved. A diverse landscape with native plants would also improve aesthetics and further enhance recreational activities. Rock structures would enhance whitewater boating by producing drops and repeated step-pools as well as create excellent trout habitat and fishing opportunity by scouring pools (Figures 2 and 3). Diverse terrestrial and wetland habitats comprised of native plants would enhance wildlife use.

The *DCRP* also proposes a pedestrian bridge across the Clark Fork River at the location of the current Duck Bridge grade in reach CFR2. This bridge would tie access to the Missoula/Clark Fork trails along the southwest bank of the Clark Fork River between Missoula and East Missoula with the Milltown and Bonner area communities and the Blackfoot River corridor.

Example of a Cable Stay Pedestrian Bridge

Note that the piers are located outside of the bankfull channel and the bridge spans part of the floodplain



The bridge would accommodate walkers, runners, and non-motorized cyclists. The piers supporting the bridge would be small and placed outside of the active channel to help maintain river health and safe boating.

Although not detailed in the *DCRP*, access for launching boats, more trails, and picnicking are possible amenities that would enhance use of the area by the public. Further planning and public input would help develop these and other ideas.

V Powerhouse Removal and Preservation Proposal

The *DCRP* objectives cannot be achieved with the powerhouse in its current location. Under the *DCRP*, the powerhouse is within the 5-year floodway (Figure 2). So, the powerhouse, divider block, and north abutment must also be removed. If kept in their current

location, these structures would severely constrict the floodplain and cause “backwater” conditions and sediment deposition upstream during flood events. Extensive and costly maintenance after each flood event would likely be needed. Addressing these problems would necessitate a complete change in the natural channel design concept, requiring substantial hardening of the channel bed and banks similar to that proposed in the remediation plan. Other probable effects of leaving the powerhouse and associated structures area are detailed in the *DCRP*.

The proposed remediation plan does not involve removing the powerhouse. It calls for the removal of the spillway and radial gate sections, creating a channel width of about 250 feet. This channel, constructed of hard engineering structures such as riprap, was designed to contain a 100-year flood event. The powerhouse would be outside the 100-year floodway. This type of channel is contrary to the objectives of the *DCRP*.

Table 2 A Comparison of the Remediation and Restoration Proposals

EPA's Proposed Remediation Plan	Draft Conceptual Restoration Plan
Includes all of Reach CFR 2 and parts of Reaches CFR1 and BFR 1 – 5,350 feet total valley length.	Includes reaches CFR1, CFR2, CFR3, CFR4, BFR1 and BFR2 – 43,460 feet total valley length.
1. Remove contaminated sediments from Area I (shown in Figure 1) to a repository west of the reservoir.	1. Same: no additional removal of sediments beyond remedy is proposed for restoration.
2. Leave Area III channel sediments in place. Sheet pile isolating Area I sediments will be removed or left in place and cut off below ground surface.	2. Remove all sheet piling
3. Remove Milltown dam spillway and radial gate structures. Other dam structures (powerhouse, divider block, and north abutment wall) would be left in place.	3. Remove all dam structures including powerhouse, divider block and north abutment wall and restore the entire area to a natural channel and floodplain.
4. Establish grade control on the Clark Fork River in the area of Duck Bridge Grade and on the Blackfoot River near the Interstate 90 overpass.	4. Establish grade controls throughout all reaches with use of many different kinds of structures to benefit natural channel processes, fish habitat, fish passage, floodplain function, boating and other resource goals. No single massive grade control structures are planned as proposed under remediation.
5. Excavate a river channel into the alluvium. The channel will be capable of carrying up to the 100-year flood within its banks. The streambanks will be rip rapped throughout Area I. The confluence of the Clark Fork River and Blackfoot River will be established upstream of the present dam location.	5. Excavate a new channel into the alluvium that is designed to carry natural channel forming flows (bankfull discharge occurring about every 1.5 years). The excavation depth would be less than under the remediation plan. A floodplain is designed adjacent to the active channel to accommodate flood flows including a 100-year flood. Streambanks would be stabilized using vegetation, rock and log structures. No riprap or armored banks are proposed. The confluence of the two rivers would be established upstream from the present dam location, slightly downstream of the confluence proposed in the remediation plan.
6. Backfill the floodplain of the Clark Fork River to re-establish a floodplain and proper grade. The floodplain would be re-vegetated with grasses.	6. Backfill the floodplain of the Clark Fork River as necessary to re-establish a floodplain to the level appropriate for the valley setting. A more intensive revegetation plan will establish diverse, self-sustaining native plant communities in the floodplain and riparian areas. Plantings will include native grasses, forbs, trees and shrubs.

1 *Draft Conceptual Restoration Plan for the Clark Fork River and Blackfoot River Near Milltown Dam*, prepared for the State of Montana, Natural Resource Damage Program and the Department of Fish, Wildlife and Parks, in consultation with the U.S. Fish and Wildlife Service and the Confederated Salish and Kootenai Tribes by Water Consulting, Inc. and Mr. Dave Rosgen, February 2003.

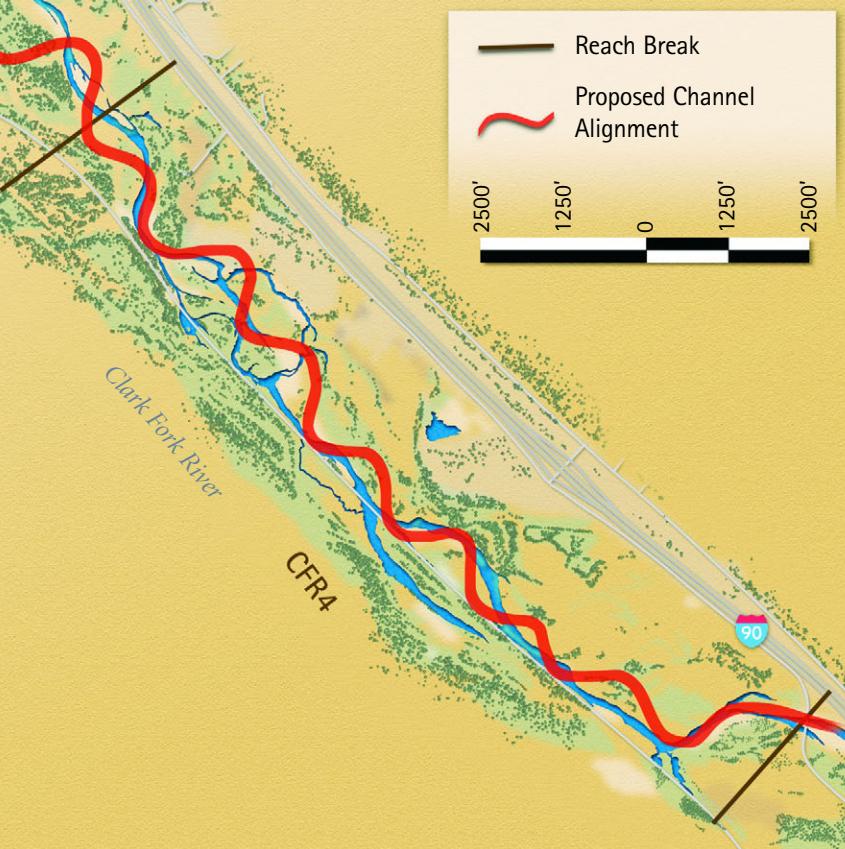
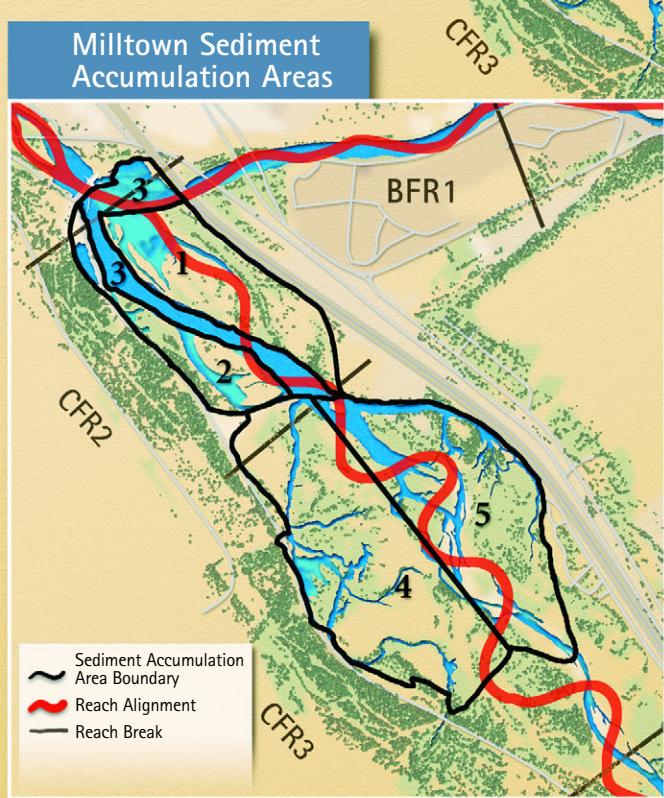
2 *Superfund Clean-up Proposal, Milltown Reservoir Sediments Operable Unit of the Milltown Reservoir/Clark Fork River Superfund Site*, U.S. EPA, April 2003.

3 *Milltown Reservoir Sediments Site Final Combined Feasibility Study*, prepared by Atlantic Richfield Company/EMC2, Dec. 2002



Figure 1 Milltown Conceptual Restoration Plan

Possible Alignment and Reach Break Map



The State understands the importance the powerhouse represents to the history of the towns of Milltown and Bonner, and the Clark Fork River. Various preservation alternatives exist to retain the historic value of the powerhouse. One alternative is to establish a museum or park with a replica of the powerhouse located near the current location, but outside the 100-year floodplain under the DCRP. The replica could include parts of the original structure such as generators. The State intends to involve the public in the decision as to what is the best alternative for the powerhouse and historic preservation.



Milltown powerhouse during 1908 flood
Removing the powerhouse is a necessary step to fulfill the goals of the DCRP, however public input is invited to consider ideas to preserve its historical significance.

Figure 2 Milltown Conceptual Restoration Plan

Proposed channel and floodplain widths with possible in-channel structures

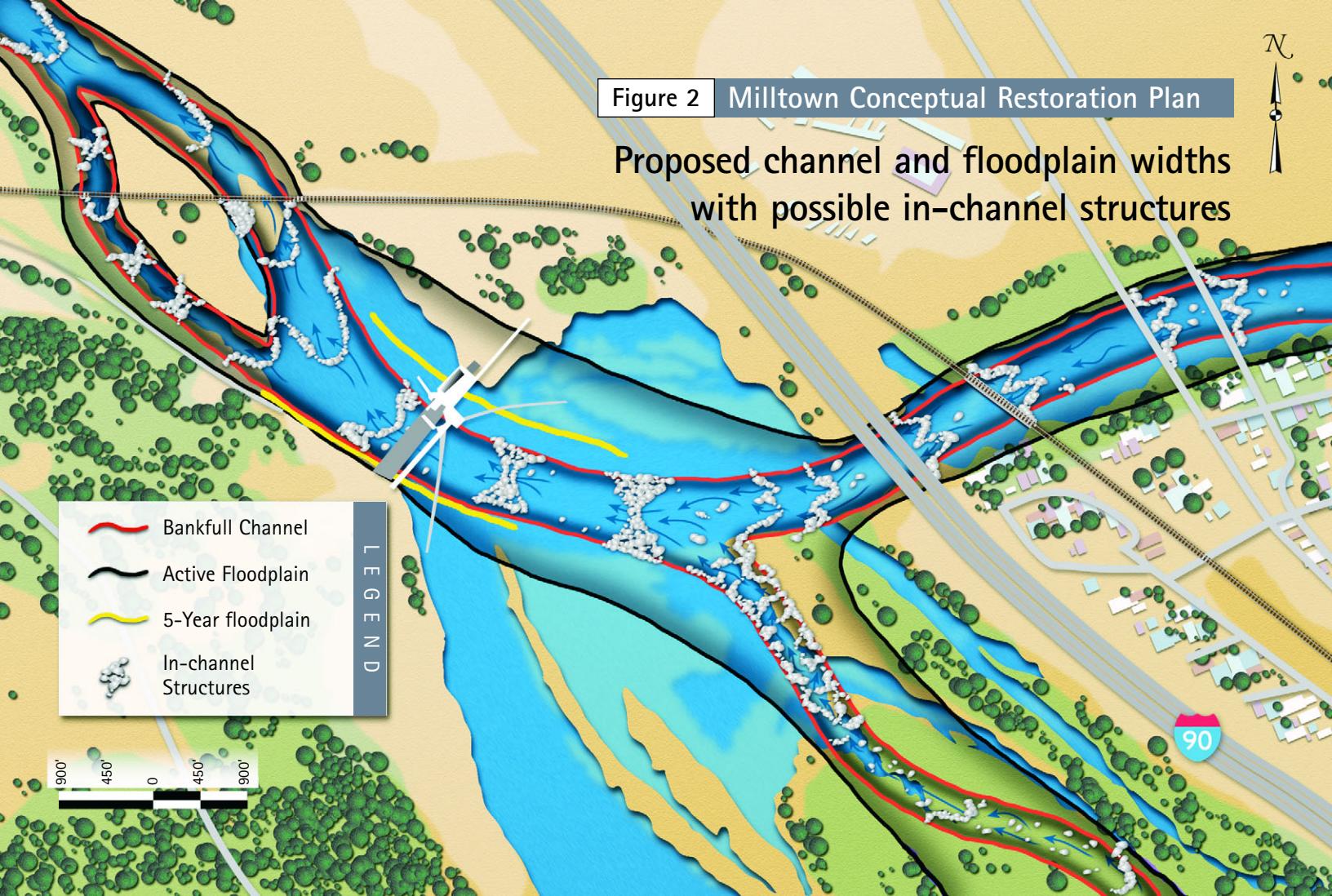


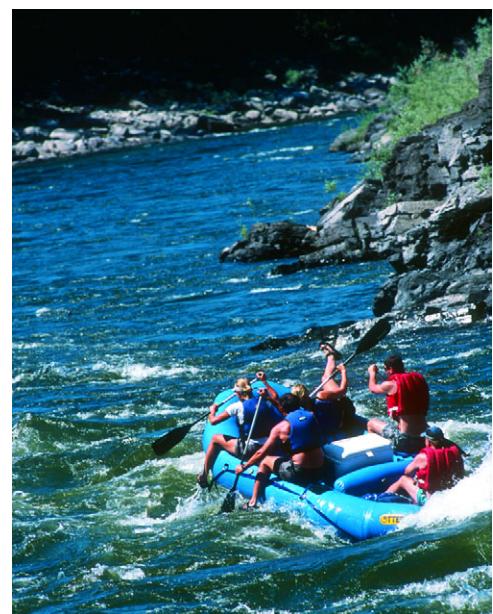
Figure 3 In-channel structures

Natural channel design uses a variety of structures for bank stabilization, grade control, and fish habitat. These structures include the use of native vegetation, trees, and rocks and are designed to mimic features that occur naturally in stable rivers.

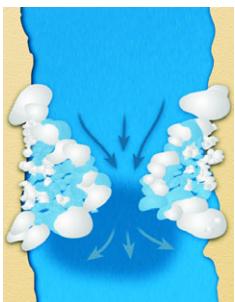
Rootwad and Log Vane Bank Stabilization



W-Weir Grade Control



Double Wing Deflector



J-Hook Vane



Converging Rock Clusters



Natural channel design will enhance water recreation opportunities like kayaking and rafting.

VI Restoration Costs and Timeline

The estimated costs to implement the *DCRP* were prepared, in part, using unit cost estimates developed by the U.S. Army Corp of Engineers for the proposed remediation plan and the costs presented in EPA's 2002 *Focused Feasibility Study*.³ Costs for stabilization and grade control structures as well as revegetation were estimated using the State consultant's best estimates of similar projects. Table 1 presents these estimated costs by river reach. The total cost for all six reaches is estimated at \$38.4 million. The total cost of restoring the four reaches closest to the dam is estimated at \$27.5 million. It is believed that significant cost savings can be achieved by integrating the restoration and remediation plans. With these savings, the total cost for the entire restoration project and for restoring the four reaches closest to the dam would be significantly reduced.

These estimates were prepared without detailed ground surveys. In addition, about 55% of the restoration cost estimate is earthwork, and is subject to modification. At this point, several assumptions and contingencies have been applied to the estimates, resulting in a significant level of uncertainty. Therefore, a contingency of 25% is included in the cost estimates. The *DCRP* cost estimates do not include costs for any land acquisitions or easements that might be needed to implement restoration actions or for the building of a powerhouse replica.

The *DCRP* provides for restoration design and implementation to occur in a phased approach over an 11-year period in coordination with the proposed remediation. Phase I involves finalizing the *DCRP* after public comment. Phase II design would refine and validate the *DCRP* with additional field data, analyses and surveys. Phase III would be the final design phase, which will include peer review, detailed drawings and information adequate to permit and implement the project. The design phase is anticipated to take three years. Construction would then begin in the upstream reaches of the two rivers and move downstream over an eight-year period. The remediation design and sediment removal would go forward at about the same time. Dam removal and work in CFR1 and BFR1 would occur in the last two years under both remediation and restoration projects.

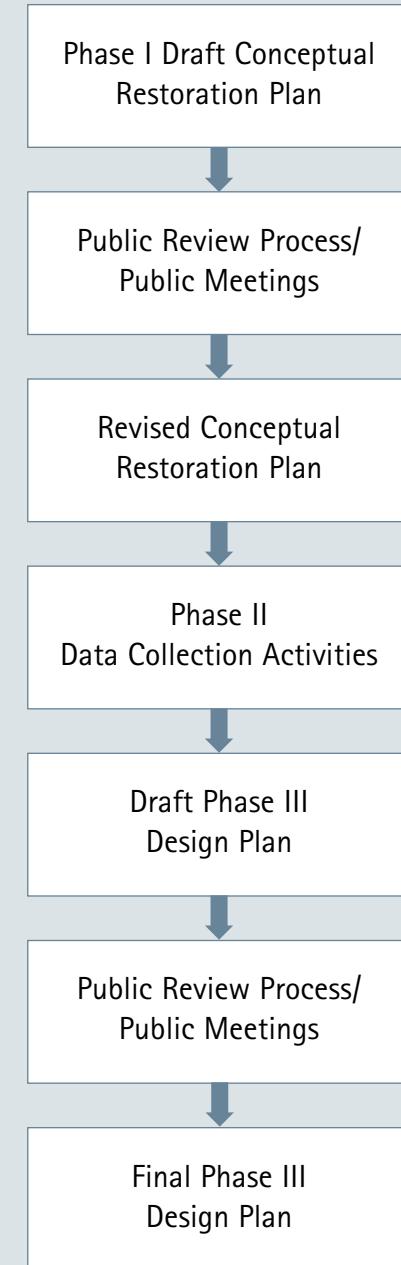


Numbers of bull trout, like this one sampled by a FWP biologist on the Blackfoot River, have declined since Milltown Dam was built. The DCRP objective to provide high quality habitat would help this species rebound in its native waters as well as enhance angling for other trout.



The confluence of the Blackfoot River with the Clark Fork River. The Old Milwaukee Railroad bed and the Milltown Powerhouse are on the left. The towns of Bonner and Milltown lie below the mountains.

Figure 4 Design Phases and Public Input



VII Public Participation

The State is seeking public input on the *DCRP*. Please send your written comments by Friday, August 15, 2003 to Doug Martin, Natural Resource Damage Program, P.O. Box 201425, Helena, MT 59620-1425, faxed to 444-0236 or emailed to nrdp@state.mt.us.

Copies of the *DCRP* are available for viewing at the public libraries in Missoula, Anaconda, Butte, and Deer Lodge, the Bonner School Library, the University of Montana library, the Missoula City County Health Department, and the Montana FWP Missoula office. Copies can also be downloaded from the NRDP website at under "Montana Lands" or from the FWP website at under "Public Notices." A CD version of the *DCRP* is also available upon request from FWP or NRDP at the contacts indicated below.

Figure 4 provides a general flow chart for the restoration planning process that highlights public input opportunities. Public input at this initial phase of restoration planning is important to help develop the best blueprint for restoring the Clark Fork and Blackfoot Rivers in coordination with the proposed remediation. The State will also solicit public input as part of developing a final design plan for the restoration actions.

The State will hold two public meetings on the *DCRP* for the purpose of further describing the draft plan to the public and receiving public comment:

Wednesday, June 11, 2003

Saint Ann's Church
9015 Highway 200
Bonner, Montana
7:00 PM

Wednesday, June 18, 2003

City Council Chambers
Missoula City Hall
435 Ryman Street
Missoula, Montana
7:00 PM

The State recognizes that landowner cooperation and approval will be necessary to assure the success of this restoration project. In the next few months, State NRDP and Montana FWP representatives will meet with landowners in the restoration project area to provide information and obtain input on the *DCRP*.

State representatives are willing to meet with area groups interested in knowing more about the *DCRP*. To request a meeting or obtain more information, contact:

Doug Martin

NRDP
P.O. Box 201425
Helena, MT 59620-1425
(406) 444-0205
dougmartin@state.mt.us

Pat Saffel

Montana FWP
3201 Spurgin Road
Missoula, MT 59804
(406) 542-5500
psaffel@state.mt.us

Copyright ©2003 by the State of Montana

Graphic design and map illustrations produced by Luke Duran, Helena, Montana • Cover photo by Craig & Liz Larcom

NRDP

Natural Resource Damage Program
P.O. Box 201425
Helena, MT 59620-1425

